Neighborhood SES, Racial Concentration, and Hormone Receptor Status among California Women Diagnosed with Breast Cancer

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Racial/ethnic disparities in the distribution of breast cancer biological subtypes are a particularly vexing public health issue. Numerous studies have found that, relative to whites, black women with breast cancer are 2 to 3 times more likely to be diagnosed with tumors that express very low levels of estrogen receptors (ER) and progesterone receptors (PR), and human epidermal growth factor receptors (HER2) [1-3]. Commonly referred to as triple negative breast cancer, this particular subtype is associated with larger and higher-grade tumors at the time of diagnosis [4], and these aggressive tumors are not responsive to current adjuvant treatments such as Tamoxifen and Herceptin [5]. As a result, triple negative tumors are associated with lower 5-year survival rates even after adjusting for other clinical features, such as stage at diagnosis and tumor grade [6]. Because breast cancer subtype is thought to be determined at the time the tumor begins to develop, observed differences in subtype distribution across groups should not be influenced by the documented racial/ethnic inequalities in access to high-quality breast cancer screening, diagnostic, and treatment resources [7].

Differences in the population-level distribution of breast cancer subtype are therefore an early, clinically-meaningful source of breast cancer inequalities, but the origins of this disparity remain unclear. Women from low socioeconomic backgrounds appear to have higher rates of triple-negative tumors [8, 9], but little work has been done to disentangle the associations among race, socioeconomic status (SES), and the differential distribution of breast cancer subtypes. The few studies that have examined SES in relation to breast cancer subtype have been limited by the conceptualization and measurement of SES [10]. State and national cancer registry data are

frequently used in these types of analyses, but given the dearth of individual-level socioeconomic data collected by the cancer surveillance systems, researchers frequently use area based socioeconomic information as proxy measures. This approach is problematic, as the area-based measures capture more than just approximate individual-level SES [11].

However, using an area-based SES measure along with neighborhood measures of racial/ethnic concentration may enable us to separate the role of local socioeconomic conditions from other socio-environmental contributions to the observed race/ethnicity disparities in breast cancer subtype. For example, recent work by Warner and Gomez [12] suggests that black women living in metropolitan areas with high levels of race-based residential segregation were significantly more likely to be diagnosed with advanced stage breast cancer and die of the disease if they lived in a block group with more non-black residents. Warner and Gomez posit that one such factor may be reduced access to social support within neighborhoods consisting of fewer co-ethnic residents. Other work suggests that blacks living in more integrated neighborhoods may also be subjected to greater levels of discrimination [13] which has also been identified as a potential risk factor for the development of breast cancer among black women [14].

The weathering hypothesis provides a useful theoretical framework for exploring the potential role of neighborhood SES and psychosocial factors related to breast cancer disparities, as it emphasizes the role of social, political, and economic marginalization on health outcomes, particularly among black women [15, 16]. Using this framework, we are conducting a cross-sectional, multilevel analysis of California Cancer Registry records merged with data from the California Neighborhoods Data System to determine whether the odds having estrogen and progesterone negative (ER-/PR-) breast cancer are associated with neighborhood SES,

neighborhood racial/ethnic composition, or both characteristics. A total of 88,205 non-Hispanic white, non-Hispanic black, and Hispanic women, ages 18 to 108, who were diagnosed with invasive breast cancer between 1996 and 2004 and lived in a census block group within a California metropolitan statistical area (MSA) are included in the analysis. Block groups are used as the neighborhood-level unit of analysis. Racial residential segregation is assessed at the MSA level and is operationalized using the multigroup entropy index, a measure of "evenness," or the degree to which all racial groups present in an MSA are evenly distributed across its component parts (i.e., census tracts).

Preliminary results from our multilevel logistic regression models indicate that increasing neighborhood SES reduces the odds of ER-/PR- breast cancer among white women only. Neighborhood SES is not independently associated with odds of ER-/PR- breast cancer among black women, but it strengthens the already significant reduction in ER-/PR- odds associated with increasing percentages of co-ethnic neighbors within this population. The relationships among breast cancer subtype, neighborhood SES, and percentage of co-ethnic neighbors is less clear among Hispanic women.

This study is among the few in the breast cancer disparities literature to analyze available SES data at the block group level. Our preliminary findings indicate that the contribution of area-based SES measures to odds of ER-/PR- breast cancer is not uniform, and that neighborhood racial/ethnic concentration is a more significant factor among black women in particular. Additional analyses will examine whether these patterns hold true within both more and less segregated MSA's and among both pre- and post-menopausal breast cancer cases.

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